

B' amended.  
19. (New) The method according to claim 17, wherein the driving step includes the substep of charging and discharging the triac drive circuit.

20. (New) The method according to claim 19, wherein the charging step includes the substep of setting a positive voltage across the triac drive circuit.--.

### REMARKS

#### I. INTRODUCTION

With the addition of new claims 11 to 20, claims 1 to 20 are pending in the present application. In view of the foregoing amendments and the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

Applicants note with appreciation the acknowledgment of the claim for foreign priority and the indication that all certified copies of the priority documents have been received.

Applicants thank the Examiner for considering the previously filed Information Disclosure Statement, PTO-1449 paper and cited references.

#### II. DRAWING OBJECTIONS

The drawings were objected to under 37 C.F.R. § 1.83(a) for allegedly failing to show each and every feature specified in the claims. The Office Action contends that the bank-selection switches, as recited in claim 1, are not shown in the drawings. Applicants respectfully disagree. In this regard, the Examiner's attention is directed to the upper right-hand portion of Figure 4, which illustrates bank-selection switches S1, S2, S3, S4, S5, S6. It is therefore respectfully submitted that the drawing adequately show the bank-selection switches recited in claim 1. Withdrawal of this objection is therefore respectfully requested.

The Office Action states that "Figures 1, 2, 5, and 6 should be designated by a legend such as --Prior Art-- because

only that which is old is illustrated." Office Action at p. 2. Applicant respectfully disagree with the characterization of Figures 1, 2, 5 and 6. The Application does not state that any of the Figures illustrate only that which is old. Accordingly, it is respectfully submitted that the legend --Prior Art-- is not required. Withdrawal of this objection is therefore respectfully requested.

### III. OBJECTION TO THE TITLE

The Title was objected to for allegedly being not descriptive of the invention. While Applicants respectfully disagree, to facilitate matters, the Title has been amended herein as suggested. Withdrawal of this objection is therefore respectfully requested.

### IV. REJECTION OF CLAIMS 1 TO 10 UNDER 35 U.S.C. § 103(a)

Claims 1 to 10 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,176,122 ("Ito") in view of "*Triac Control using the COP400 Microcontroller Family*," National Semiconductor's COP, Note 6, February 1981 ("Note 6"). Applicants respectfully submit that the combination of Ito and Note 6 does not render obvious the present claims for the following reasons.

The Office Action contends that Ito discloses all the features of claim 1, except for bank selection switches including triacs and triac drive circuitry. The Office Action further contends that Note 6 discloses the use of triac control systems for the purpose of providing the computational ability and speed to intelligently manage power in many electrical situations. From the foregoing, the Office Action alleges that "[i]t would have been obvious to one skilled in the art at the time the invention was made to use a triac control of the COP400 Microcontroller Family disclosed by National Semiconductor's COP Note 6 on the apparatus disclosed by Ito for the purpose of providing the computational ability and speed to intelligently manage power in this particular electrical situation." Office Action at pp. 3 to 4. Applicants respectfully disagree.

Claim 1 recites an apparatus for driving piezoelectric fuel injector elements divided into a plurality of injector banks. Each of the injector banks contains at least one piezoelectric element, and each injector bank may be charged or discharged by a respective bank-selection switch, which includes a triac and triac drive circuit.

Note 6 purports to relate to power control applications using National Semiconductor's COP400 microcontroller family and low-cost triac interfaces. (See, Note 6, Section 1.0). In one power control application, Note 6 describes the use of digital logic and a triac to detect the zero-voltage crossing of an AC signal. (See, Note 6, Sections 1.3 and 2.0). In another power control application, Note 6 describes the use of a COP400 microcontroller and a triac to control the intensity of a light. (See, Note 6, Section 1.0).

The references used to support an obviousness rejection must be analogous prior art, i.e., either related to the same field of Applicants' endeavor or reasonably pertinent to the particular problem with which the invention is concerned. In re Oetiker, 977 F.2d 1443, 1446 (Fed. Cir. 1992). Furthermore, to establish prima facie obviousness of a claim, there must exist, inter alia, some motivation or suggestion to combine references in the manner contemplated by the claim. In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991).

It is respectfully submitted that Note 6 is non-analogous art because it is neither related to nor pertinent to the present invention. Note 6 is concerned only with power control applications. However, the triac circuitry recited, for example, in claim 1 has absolutely nothing to do with power control, much less the power control applications described in Note 6. The triac drive circuitry and triac recited in the claims do not detect the zero-voltage crossing of an AC signal and do not control the intensity of a light. Rather, as stated in the Specification, the triac drive circuitry and triac are used to charge and/or discharge a piezoelectric actuator assigned to a fuel injector bank -- which is simply not a power control application. In short, Note 6 is completely unrelated to

piezoelectric actuators and is not at all pertinent to piezoelectric actuator control of fuel injector banks.

Furthermore, the Office Action admits that Ito "fails to disclose a bank selection switch, which includes a triac with a triac drive circuit." Office Action at p. 3. The Office Action does not even allege that Note 6 discloses, or even suggests, a bank selection switch, which includes a triac with a triac drive circuit. Additionally, it is respectfully submitted that neither Ito nor Note 6 discloses, or even suggests, the use of triacs for piezoelectric actuator control and, as such, provides absolutely no motivation or suggestion to modify Ito as proposed in the Office Action.

To support the obviousness rejection of claims 7 to 10, the Office Action merely contends that "developing an appropriate method for driving the claimed piezoelectric fuel injector elements is necessary, and inherently obvious, to properly use the claimed invention." Office Action at p. 4. Such conclusory statements cannot support the obviousness rejection of claims 7 to 10.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, supra. Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). As indicated above, neither Ito nor Note 6 discloses, or even suggest, the "bank selection switch includ[ing] a triac with a triac drive circuit" as recited in claim 1. Furthermore, it is respectfully submitted that neither Ito nor Note 6 discloses, or even suggests, the limitation of

"each bank being selected for charging or discharging by a bank selection-switch, characterized by driving a triac drive circuit" as recited in claim 7. It is therefore respectfully submitted that the combination of Ito and Note 6 does not render obvious claims 1 and 7.

Moreover, it is respectfully submitted that the cases of In re Fine, supra, and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that the Office Action's generalized assertions that it would have been obvious to modify or combine the references do not properly support a § 103 rejection. It is respectfully submitted that those cases make plain that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect the proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. This it has not done. . . .

Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added). Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .

Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the



modifications . . . necessary to arrive at the claimed [invention].

In re Jones, 21 U.S.P.Q.2d at 1943, 1944 (citations omitted; italics in original).

That is exactly the case here since it is believed and respectfully submitted that the present Office Action offers no evidence whatsoever, but only conclusory hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding. Unsupported assertions are not evidence as to why a person having ordinary skill in the art would be motivated to modify or combine references to provide the claimed subject matter of the claims to address the problems met thereby. Accordingly, the Office must provide proper evidence of a motivation for modifying or combining the references to provide the claimed subject matter.

More recently, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not the case here -- there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed," stating that:

In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed. In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper prima facie case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Fed. Cir. 2000) (emphasis added). Again, it is believed that there have been no such findings.

Accordingly, there is no evidence that the references relied upon, whether taken alone, combined or modified, would provide the features and benefits of claims 1 and 7. It is therefore respectfully submitted that claims 1 and 7 are allowable for these reasons.

As for claims 2 to 6, which ultimately depend from claim 1 and therefore include all of the limitations of claim 1, and claims 8 to 10, which ultimately depend from claim 7 and therefore include all of the limitations of claim 7, it is respectfully submitted that the combination of Ito and Note 6 does not render obvious these dependent claims for at least the same reasons given above in support of the patentability of claims 1 and 7. In re Fine, supra (any dependent claim depending from a non-obvious independent claim is non-obvious).

**V. NEW CLAIMS 11 TO 20**

New claims 11 to 20 have been added herein. It is respectfully submitted that new claims 11 to 20 do not add any new matter and are fully supported by the present application, including the Specification. It is respectfully submitted that these claims are allowable.

**VI. CONCLUSION**

In light of the foregoing, Applicants respectfully submit that claims 1 to 20 are currently in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

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